AUGUST 1961 VOL. 9

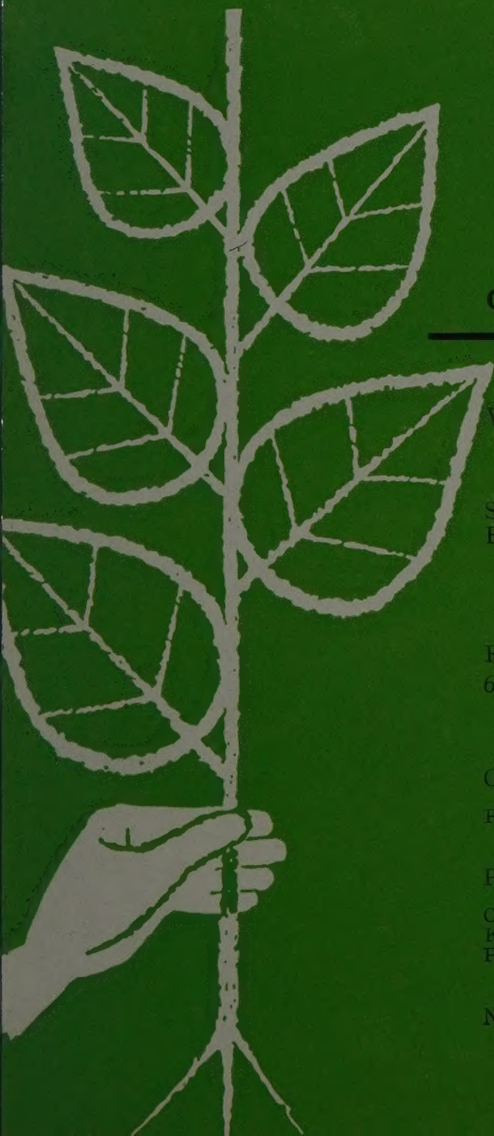
FAO

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS - ROME

PLANT PROTECTION BULLETIN

7

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS



CONTENTS

FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

Manuscripts for publication, or correspondence regarding the World Reporting Service, should be addressed to Dr. Lee Ling, Plant Production and Protection Division, FAO, Viale delle Terme di Caracalla, Rome, Italy; subscriptions and other business correspondence to the Distribution and Sales Section, FAO, Viale delle Terme di Caracalla, Rome, Italy.

The Bulletin is now issued bimonthly in English, French and Spanish. Subscription rates are $5.00 or 25*s*. per annum ; single numbers are priced at $0.50 or 2*s*. 6*d*. The citation is *FAO Plant Protection Bulletin* or, in abbreviation, *FAO Plant Prot. Bull.*

Vol. 9, No. 7 - August 1961

FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

World Citrus Problems

II. THE GAZA STRIP

L. C. Knorr, Citrus Experiment Station, University of Florida, Lake Alfred, Florida; and *Walter Ebeling*, University of California, Los Angeles, California

The lines drawn in 1947 for the creation of the new nation of Israel cut across Palestine, disrupting many long-established patterns of agriculture and marketing. Subsequent events led to further difficulties as wells were blown up, irrigation pumps hauled away, and owners dispossessed. By 1958 Palestine to the southwestward had been reduced to what is today known as the Gaza Strip, a vestigial appendix some 30 miles long and 6 miles wide. There are 200,000 refugees and 100,000 original inhabitants in a population density of 5,000 people per square mile. Subsistence is provided by an agriculture based on 60,000 tillable acres, the remaining 19,000 acres of the Gaza Strip being sand dune.

Before partition, the area around Gaza was part of the maritime plain that stretched from the Egyptian frontier on the Sinai Peninsula to Mount Carmel on the north. The world-renowned Shamouti orange was originally cultivated in this area. Today, the Armistice Line severs the coastal belt of citrus at a distance 35 miles below Jaffa — Tel Aviv; south of this line, the citrus belt continues toward its end some 17 miles distant at Dir El Balach. Within this 100-square-mile rectangle there grows the citrus upon which present-day Palestine depends for its main source of income.

The following account is based on a visit to the Gaza Strip by both authors from 28 to 30 November 1960, and by the first author from 23 to 28 April and from 3 to 7 June 1961. The limited time available for the visits was utilized to best advantage because of the presence of such helpful experts and officials as A.H. Nasharty, L.T. Mahmoudi, Paul F. Keim, A. Fathy, Farid Nour-Eldin, Mahrus S. Hassan, Fahmi Turk, and Major Fathi Hussein.

Cultural conditions

Soils. In the citrus-growing area of the Gaza Strip, soils vary from sandy loams to sand dunes. The latter are being stabilized and reclaimed by the government and then sold to farmers. When reclaimed dunes are used for citrus, it is the practice to add a layer of clay for further stabilization and for mechanical conditioning of the soil. An average application of clay amounts to a thickness of about 30 centimeters and costs U.S.$160 per dunum (4 dunums = 1 acre). The remaining tillable land is made up of sandy loams interspersed with occasional tracts of heavy soils; these are remarkably fertile, considering that they have had little or no manuring over the centuries.

Climate. The climate of the Gaza Strip is Mediterranean and mild. There are two distinct seasons: a rainy period from late October to mid-April, and a dry period the rest of the year. Annual rainfall at Gaza fluctuates considerably, ranging from 110 to 660 millimeters; on the average, it totals 378 millimeters yearly. Because this amount is inadequate for the growing of citrus, additional water is supplied from wells.

Irrigation. Irrigation waters range from sweet (300-700 ppm soluble salts) at the north-

ern end of the Strip to salty (3,000-7,000 ppm soluble salts) at the southern end. For citrus, the breaking point occurs in the vicinity of Gaza; southward, the wells become increasingly salty and citrus suffers proportionately. Below Dir El Balach the commercial growing of citrus comes to an end.

Scion and stock varieties. Scion varieties include, among sweet oranges, Shamouti, Valencia, and the acidless Sukary; among mandarins, Belady (or common), Clementine, and Dancy; Italian-type lemons; and various grapefruits. In addition to commercial varieties, there are also a few trees of Temple, tangelo, belady lime, limequat, pummelo and chinotto.

Rootstocks are limited to sweet lime (syn. Palestine sweet lemon) and sour orange. About 3,000 dunums, mostly the older plantings, are on sweet lime; the rest (comprising some 15,000 dunums, and including most of the recent plantings) are on the xyloporosis-tolerant but tristeza-susceptible sour orange. It is the concensus among growers that sour orange produces a bigger tree and tolerates clayey soils and brackish waters better than does sweet lime. On the other hand, sweet lime is thought to yield better and to cause less trouble with alternate bearing, particularly when the scion variety is Shamouti.

Horticultural practices. Trees are currently being started by growing rootstock seedlings in flats; when in the 6-leaf stage, seedlings are transplanted at 25-centimeter intervals in the nursery row. When these attain a height of about 100 centimeters, they are moved to the grove and re-established at spacings of the final planting. A year later, they are budded in place.

During the time the seedlings make size in the grove, grains are grown in the middles; particularly is this intercropping practiced whenever soils are saline.

Spacing of trees varies from grove to grove; it ranges from 4 × 4 meters to 8 × 8 meters. When the rootstock is sweet lime, the distance is usually 4 × 4; when sour orange, 4 × 4 to 7 × 7. Tops meet at an early age and subsequently preclude the use of machinery between trees.

Fertilization is generally limited to the use of barnyard manure; occasionally, supplemental applications are made of nitrogen, phosphorus, and potassium fertilizers.

Pest control practices. In the nursery, no pesticides are used, since plants are unaffected by scab, anthracnose, and insect pests. In the grove, trees receive a single dust application of sulfur; this is applied sometime between June and October. Sulfur is used to control russet, but judging from the small amount of blemished oranges seen in the market place at Gaza (which consumes the fruit unsuitable for export), russet is not the serious problem it is in other parts of the world, notably Florida.

Control of scale is attempted by application of medium oil emulsion, usually 1 percent. The lack of satisfactory results suggests that better control would be obtained if the percentage of oil in the emulsion were increased. The impenetrability of most groves, however, makes proper application a virtual impossibility.

Production and marketing factors

Citrus production is the main economic pursuit of the Gaza Strip and provides the chief source of income. Approximately 90 percent of the fruit grown is shipped abroad, to European as well as Arabian markets. The volume of exports for the period 1956-60 is shown in Table 1.

The area devoted to citrus is at present 18,000 dunums. This represents a sizable increase from the 8,000 dunums of two years ago, and attests to the accelerated pace of citrus growing. About 10,000 dunums are in bearing trees.

Harvesting starts in mid-October and ends in mid-April. Shamouti oranges are picked as early as the middle of October — about a month earlier than the same variety is harvested north of the Armistice Line. It is claimed that the achievement of a 7 to 1 ratio of solids to acid is attained earlier in Gaza because of favorable climatic conditions and the presence of sandy soils. Picking dates for varieties other than Shamouti are: Valencias — February through April; Sukary oranges —

TABLE 1. EXPORT OF CITRUS FRUITS FROM THE GAZA STRIP, 1956-60

Season	Quantity exported, in 1,000 boxes of 40 kilograms each							
	Oranges			Mandarins		Lemons	Grapefruits	Total
	Shamouti	Valencia	Sukary	Belady	Clementine			
1956/57	64	46	—	—	—	4	2	116
1957/58	109	63	9	1	17	12	5	216
1958/59	289	88	6	4	19	26	7	439
1959/60	253	129	9	6	17	21	8	443

December; mandarins — January and February; lemons — January; grapefruits — January.

There is increasing interest in the growing of Valencias. Spaces left by removal of dying trees as well as new groves are being planted to Valencias; at present this variety brings 1½ times the price of Shamoutis on the European market. Valencias are favored also for their superior shipping qualities and because of the feeling that they are less susceptible than are Shamoutis to salt injury and to insect damage. Although it is not generally appreciated among growers, Valencias, being budded on sour orange, are certainly tolerant to xyloporosis, whereas many of the older Shamouti plantings on sweet lime are suffering from xyloporosis.

Prices realized abroad have generally been below prevailing market levels and reflect the attitude among buyers that fruits from Gaza are inadequately graded with respect to ripeness, color, and size. The recent establishment of a modern packing house of 80-ton/8-hour-day capacity should do much to remedy some of these shortcomings and to improve receptivity of Gaza citrus.

Disease problems

Xyloporosis. The principal disease in groves of the Gaza Strip is xyloporosis. This will come as no surprise to those familiar with citrus pathology at the eastern end of the Mediterranean where Palestine sweet lemon has long been employed as a rootstock. The first observation and the original description of xyloporosis were made in Palestine in the early thirties (8).

Today it is mainly the old groves of Palestine sweet lemon that are affected by xyloporosis. None of the trees on sour orange, which now constitute 80 percent of the acreage, show ill effects from the virus.

Of the 20 percent of the trees that are continuously on Palestine sweet lemon, many are in a marginal state of productivity. Not all of the depauperate growth, however, can be attributed to xyloporosis. Entire blocks of Shamouti orange trees on Palestine sweet lemon have been found to exhibit a uniform depression of growth, with only scattered trees showing the greater degree of stunting and the characteristic pitting and pegging o xyloporosis. The general "running-out" effect, which disposes some growers to the belief that the natural life span of citrus trees is only 25 years, suggests that sweet lime is liable to troubles other than xyloporosis, and that these troubles are more serious than xyloporosis itself. The fact that sour orange does better in the heavier, wetter soils of the Strip points to the possibility that *Phytophthora* fungi may be destroying roots of the more susceptible sweet lime (1). Also involved may be a decline that correlates with the presence of vascular honeycombing in the

scion (i.e., Shamouti) portion of the trunk immediately above the bud union. This gum-free inverse pitting is found, in the absence of xyloporosis pitting, in the sweet lime stock, and recalls a trouble previously described from Egypt by Nour-Eldin and Childs (5).

In some blocks of Shamoutis on sweet lime rootstocks, xyloporosis has been found to affect as high as 15 percent of the trees. In other blocks, many of the affected trees have been removed, so that maximum figures for damage due to xyloporosis are obliterated.

More ingenuous than ingenious is the occasional practice of putting two sweet-lime-rooted trees in each planting hole, thus hopefully providing at least one tree that will not be affected by xyloporosis.

Fovea. In a block of ten-year-old Clementine mandarin trees on sweet lime rootstock, approximately 10 percent of the trees were found to be in a marked state of stunting and decline. This condition was correlated with a honeycombing (inverse pitting) and gumming in the vascular region of the trunk, beginning at the bud union and progressing upward for a distance of several feet into the framework of the tree. Symptoms, both external and internal, resemble those found in the fovea disease that affects Murcotts in Florida (3). It is still not known whether fovea is a varietal response to xyloporosis or cachexia virus or whether another virus is involved. Five out of the six trees examined showed no xyloporosis pitting in the sweet lime portion of the trunk; this would suggest that xyloporosis and fovea are indeed separate troubles.

Psorosis. While many trees showed the early leaf symptoms of psorosis (1,4), very few were found to exhibit the bark shelling and decline aspects of this virus disease.

Tristeza. Tristeza is an important consideration in a country where most trees are on sour orange rootstock. The sudden advent of tristeza virus in combination with an efficient vector like *Toxoptera* (*Aphis*) *citricidus* (Kirk.) could spell havoc, as it did in Argentina, where 20 years after introduction of this nefarious pair, five sixths of the 12 million trees of the country were killed.

A reservoir of tristeza already exists in Israel. Earlier reports (6, 9) showed that the virus was present in introduced varieties, but a later report (7) indicated that the tristeza virus also occurred in 82 out of 8,000 Shamouti orange trees in commercial groves.

A lookout was maintained for trees on sour orange stocks in a state of tristeza-like decline. Trees of *lamoon belady* (syn. Key lime) were also examined for the foliar vein-clearing symptoms indicative of tristeza. In no cases, however, were any suspicious symptoms seen.

While *Toxoptera citricidus* is not known at present in the Mediterranean area, two other species of aphid vectors were recorded from Palestine. One is the previously reported *Aphis gossypii* Glov., and the other, *Toxoptera aurantii* (Fonsc.), is reported here for the first time as occurring in Palestine. Neither species, however, is very effective in transmitting tristeza, and under conditions observed in the Gaza Strip, neither appears likely to do much damage. A more threatening prospect is the chance introduction of *T. citricidus*, either from India or from equatorial Africa.

Stubborn. One grower mentioned a disease producing acorn-shaped sweet orange fruits with the rind at the navel end being particularly thin. Twigs were described as being "snaky," and the growth of the tops so reduced that the grower had the trees (6 out of 2,000) removed. This would suggest the presence of stubborn disease. At times, trees were seen that bore some of the early stage symptoms described for stubborn, such as imbricated foliage, rounded and cupped leaves, and poor fruiting, but single observations are not considered adequate to implicate the existence of stubborn virus.

Fruit rot. Much trouble has been experienced during the past season with a rotting of fruits on the tree and in transit. Some shipments were reported to have arrived in Europe with 40 percent decay. No examples of this rot were seen during the visits to Gaza, but the following reasons suggest that the trouble

is *Phytophthora* brown rot (1, 4): (*a*) fruits were reported to be rotting on the tree shortly after heavy rains that continued for several days during November of 1960; (*b*) fruits appeared sound on packing but developed decay in shipment; (*c*) the rot was brown in color, firm in texture, and pungent in odor.

Entomological problems

Scales. When trees are planted 264 to the acre, pest control obviously becomes difficult. Even at greater spacings, including the prevalent 7 × 7 meters, canopies soon join and make imposible the use of machinery in the rows. Pesticides are applied by stationing sprayers at the edges of the groves and by dragging garden-type hoses from the tanks to positions between the rows. Inadequate pressure and faulty coverage result in poor control; in addition, there is the custom of using 1 percent medium oils, when what obviously is needed is a 2 percent oil.

Aonidiella aurantii (Mask.) is the most prevalent scale. In recent years, it appears to have crowded out the "black" scale, *Chrysomphalus aonidum* (L.). Also present, but only of moderate concern, is *Ceroplastes* sp.

Rust mite. Present practice calls for the application of one sulfur dust annually to prevent russet. Rust mites are present, the species being *Phyllocoptruta oleivora* Ashm. The whole citrus-growing area is dusted between June and October. Control of russet is obtained in variable degrees; about 10 percent of the fruits on the local market are russetted.

Applications of sulfur are generally made with knapsack dusters. Deposits are uneven; some leaves are so heavily coated that appreciable quantities of sulfur persist for as long as half a year, especially during the dry summer months. Heavy residues cause further troubles when oils are later applied on top of them. Much oil-sulfur burning of the fruit was in evidence, and one of the factors responsible for the many recently killed twigs and branches in some groves, as well as the prevailing thinness of the foliage, is probably the toxic interaction of these two pesticides.

Zineb (zinc ethylene bisdithiocarbamate), a material found in Florida to be exceedingly effective for the control of russet (2), has not been used. This material would provide better control of russet and would not damage the fruit and foliage as oil and sulfur.

Aphids. Visits to the Gaza Strip took place during times when aphid populations were below peak levels; nevertheless, various species were encountered on citrus. Because of interest in aphids as vectors of tristeza, various collections were made and prepared for identification. *Toxoptera aurantii* (Fonsc.) was found on *Citrus sinensis* and *C. aurantifolia*; *Aphis gossypii* Glov. on *C. sinensis*; and *Aphis craccivora* Koch and *Myzus persicae* (Sulz.) on *C. paradisi*.

Mediterranean fruit fly. Ceratitis capitata (Wiedemann) occurs in the Gaza Strip. While damage to fruit does not appear to be excessive, the fly does affect the time of picking. Because of increased damage to the fruit as the season progresses, all fruit must be picked by the middle of April.

Control measures are desultory; traps are used by some growers, while others apply lindane three or four times a year.

Nutritional problems

Because of the increasing shortage of barnyard manure and the growing expansion of citrus plantings, nutritional problems are present and may be expected to get worse. Many groves show foliar symptoms of a deficiency in zinc, iron, and manganese. Whenever barnyard manures are supplemented by fertilizers, the mixture consists only of nitrogen, phosphorus, and potassium. It is not known to what extent elements are tied up in the soil because of high pH values.

Conclusion

There are many opportunities for increasing production and the percentage of marketable fruit in the Gaza Strip. Fortunately, most of the correctives have already been worked out elsewhere and need only to be adapted to

local conditions. Other problems unique to the area can be solved through the guidance of the Ministry of Agriculture.

It is a different matter, however, to say whether a further increase in citrus production is warrantable at the present time. The principal problem facing Gaza's industry is transportation. Partition left this appendage of a former territory without its traditional port facilities. At present exports are limited to the inadequate port of Gaza, where only a few ships a week make call and where vessels must anchor 500 meters offshore. At the port of Gaza, lighters cannot approach the dock closer than 15 meters, and to reach lighters, stevedores must wade waist-deep in salt water that occasionally laps at the boxes of fruit atop their heads. The government is currently considering improvement of port facilities; when these plans materialize, the expansion of Gaza's citrus industry should meet with much greater chances of success.

Literature cited

1. Fawcett, H.S. 1936. *Citrus diseases and their control.* McGraw-Hill Book Co., New York. (cf. p. 177).
2. Fisher, F.E. 1957. Control of citrus fruit russet in Florida with zineb. *Phytopathology* 47 : 433-437.
3. Knorr, L.C. and W.C. Price. 1959. Fovea — a disease of the Murcott. *Citrus Magazine* 22(1) : 16-19, 26.
4. Knorr, L.C., R.F. Suit and E.P. DuCharme. 1957. Handbook of citrus diseases in Florida. *Florida Agr. Exp. Sta. Bull.* 587.
5. Nour-Eldin, F. and J.F.L. Childs. 1957. Sweet orange bark pitting, an unreliable symptom of tristeza infection. *Plant Disease Reptr.* 41 : 1011-1013.
6. Reichert, I. and A. Bental. 1957. Additional tristeza-infected citrus varieties found in Israel. *FAO Plant Prot. Bull.* 5 : 129-130.
7. Reichert, I., A. Bental and O. Ginsburg. 1960. Tristeza disease in native commercial citrus trees in the Mediterranean. *FAO Plant Prot. Bull.* 8 : 43-45.
8. Reichert, I. and J. Perlberger. 1934. Xyloporosis, the new citrus disease. *Hadar* 7 : 163-167, 172, 193-202.
9. Wallace, J.M., I. Reichert, A. Bental and E. Winocour. 1956. The tristeza virus in Israel. *Phytopathology* 46 : 347.

Stalk and Root Rots of Maize in the United Arab Republic

K. A. Sabet, Cairo University, Giza, *A.S. Samra*, Maize Disease Laboratory, Giza-Orman, *M.K. Hingorani*, FAO, Cairo, and *I.M. Mansour*, Maize Disease Laboratory, Giza-Orman

A stalk rot disease of maize, characterized by typical soft rot symptoms, was first reported from Egypt during the summer of 1953 (4). It was subsequently found to be caused by a strain of *Pectobacterium carotovorum*, for which the name *P. carotovorum* f. *zeae* was adopted (3). This was the first record of *P. carotovorum* affecting a member of Gramineae. Since then, the same or a similar bacterium has been found to cause stalk rot of maize in India, Rhodesia, Australia, United States, and several other countries (1). Recently, however, a somewhat different disease affecting maize stalks has become prevalent in Egypt, which has caused great concern to both maize breeders and maize growers. Different opinions have been expressed as to the cause of this trouble, thus creating considerable confusion. In view of this, it was considered desirable to carry out a thorough investigation of the disease to determine its true cause, so that effective measures can be taken to prevent the heavy losses of the maize crop.

Distribution and nature of stalk rots

The survey of the disease in the maize-growing areas of Egypt was undertaken during the period from September to early December in 1960. It was designed only to obtain information on the incidence, distribution and nature of maize stalk rots prevailing in Egypt. The provinces visited were Kafr El-Sheikh, Gharbiya, Qalyubiya, Minufiya, Dakahliya, Dammietta, Giza, Beni-Suef, Faiyum and Minya. The following findings from the survey appear to be of special interest.

1. The stalk rots observed could be broadly classified into three conditions namely, "slow wilt," "wet rot" and "soft rot." The "slow wilt" condition was predominant throughout the area visited. The "wet rot" condition, which was associated with dry rot, was prevalent mainly in Minufiya and Kafr El-Sheikh provinces, where borer infestation was invariably heavy. It was a condition originating from mixed infection. The "soft rot" condition, which was recorded previously by Samra (4) and Sabet (3), was observed only once at Mushtuhur in Qalyubiya province.

2. Minya province, which was said to be free from the disease during 1959, showed a high percentage of "slow wilt" condition in the absence of any borer infestation, indicating the lack of correlation between the two. This condition was common in Beni-Suef and Minya provinces, while in the other areas visited mixed infections were observed in most cases.

3. In the case of mixed infections, *Rhizoctonia bataticola*, *Fusarium moniliforme* and other species of *Fusarium* and several saprophytic bacteria and *Bacterium lathyri* — a weak secondary parasite — were found associated with the unidentified "slow wilt" organism. Of these, *Rhizoctonia bataticola*, producing charcoal stalk rot symptoms, occurred more frequently and appeared to be of some importance.

4. The disease was widespread in all the areas visited, except Beheira province, and the rate of infection ranged from 5 to 25 percent in fields selected at random. The maximum infection was observed at Mushtuhur in Qalyubiya province and the minimum in Beheira province.

5. Maize hybrid varieties appeared to be more susceptible to the disease than the open-pollinated varieties. This was very clear in many places, particularly in Faiyum province, where Giza 76 hybrid variety was grown side by side with American Early or Baladi open-pollinated varieties.

Maize fields were also visited in June-July 1961, along the roads from Cairo to Sids and from Cairo to Dammietta. At this time the crop was found to be almost free of "slow wilt" and "wet rot" infection. However, several cases of "soft rot" were observed in these areas and at Bahteem, while a solitary case of severe root rot, hitherto unrecorded, was found at Sids. This more frequent occurrence of the "soft rot" condition in 1961 is attributed to the unusally high temperature and humidity prevailing during the months of May and June.

Slow wilt

Symptoms of the "slow wilt" condition suggest, at first sight, a dry stalk rot. On close examination of the early stages of infection, however, no tissue decay can be traced above or below the ground level. The plants wither prematurely from base to top at the time of flowering or sometime later. The leaves at first become dull green, showing in general the symptoms of water deficiency. Finally, they turn yellow and appear withered and dried up. Meanwhile, elongated streaks, varying in color intensity from yellow through reddish brown to red, appear on the still green stalks (Figure 1). If an infected stalk is cut open lengthwise at this stage, yellow to brownish streaks are observed extending into a number of internodes. The discoloration is more conspicuous at the nodes, which become reddish brown. The vascular bundles, particularly those at the periphery in a cross section, are stained yellow to red. In advanced cases of infection, the lower internodes become shrunken and hollow; mycelial growth appears at the nodes, particularly near the ground level. Root tips of the infected plants are stained red at an early stage of the disease development. Later on, the reddish color

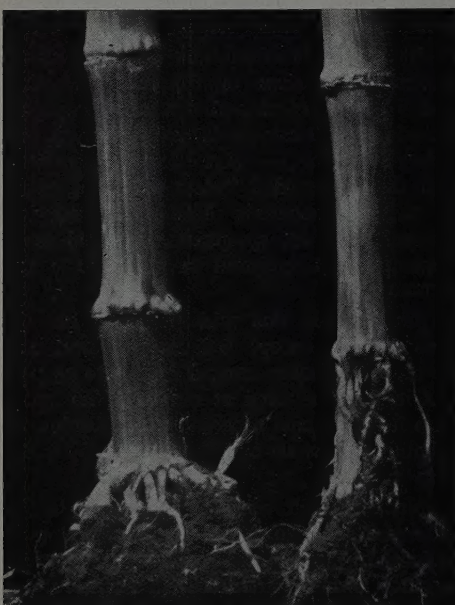


Figure 1. Maize stalks naturally infected, showing the early stage of "slow wilt," with brown streaks on the exterior.

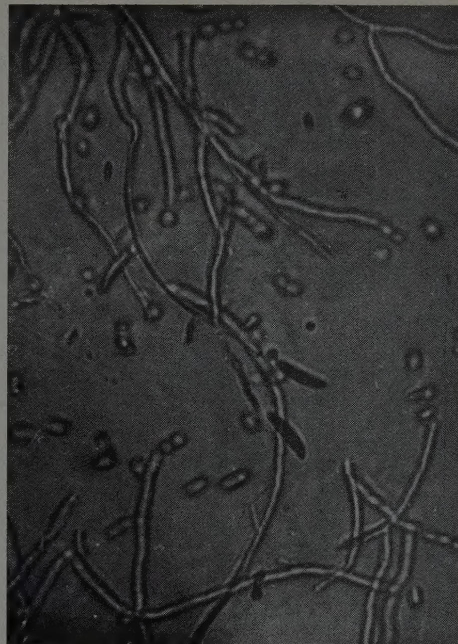


Figure 2. A single-spore culture of the pathogene of the "slow wilt" condition of maize, which had been exposed to ultraviolet radiation, showing the production of both macroconidia and microconidia.

spreads along the fibrous roots, several of which become hollow and show decay. In extreme cases of infection, no cob formation takes place, and if any grain is formed at all, it is shrunken and poorly developed.

The pathogene resembles *Fusarium* in both growth characters and pathogenic effect, producing typical wilt symptoms. However, it does not produce typical *Fusarium* spores (macroconidia). When one of these isolates was exposed to ultraviolet radiation, it started producing freely both micro- and macroconidia (Figure 2), unlike the original isolate, which develops sparsely small, hyaline, elliptic spores on short sterigmata-like structures in addition to sclerotia. Pathogenicity tests with the single-spore culture of the ultraviolet light-induced mutant and the original isolate have so far given erratic results. The pathogene therefore remains unidentified.

Wet rot

The "slow wilt" condition is quite often found associated with infection by secondary invaders, both fungi and bacteria, which apparently produce the "wet rot" symptoms. Multiple infections are not uncommon in the Delta region, particularly in Minufiya and Kafr El-Sheikh provinces, where borer infestation is heavy. This is unlike the "slow wilt" condition, which was commonly found in Beni-Suef and Minya provinces in the absence of borers. Symptoms of the "wet rot" condition include both slow wilt and tissue decay in the lower internodes (Figure 3), with different degrees of wetness and without any obvious foul smell. It is not considered by the writers as a separate pathological condition, but a modification of the "slow wilt," originating from an interaction between the "slow wilt" organism and secondary invaders due to borer attack. No pathogene other than the unidentified "slow wilt" organism, *Rhizoctenia bataticola* and *Fusarium moniliforme*, which do not produce "wet rot" symptoms by themselves, has so far been isolated from the diseased specimens showing "wet rot" symptoms.

Figure 3. Maize stalk infected naturally, showing advanced stage of the "wet rot" condition.

Soft rot

The "soft rot" condition, as described by Sabet (3), is not very common at present, as it was some years ago. It has, however, been observed at Mushtuhur (Qalyubiya province) in September 1960 and July 1961, in Alexandria and Giza provinces during July-August 1961, and at Sids (Beni-Suef) in June 1961. This condition, which is due to bacterial infection, is typified by the basal internodes of the stalks turning into a soft mass of disintegrated brown tissues, at which point the stalk generally breaks (Figure 4.). A strong foul smell is detectable under natural conditions of infection, apparently due to the presence of secondary invaders, as in the artificially inoculated plants such an odor is not present, and a white exudate can be easily pressed out of the cut surfaces of the infected stalks. The rot may also involve the leaves, sheaths and ear shanks, which become water-soaked at

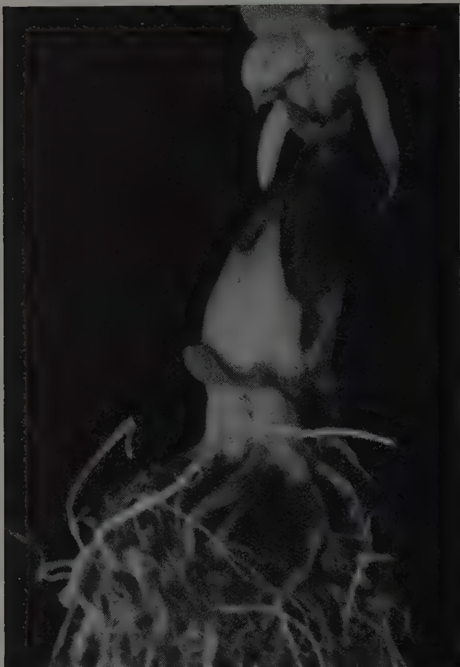


Figure 4. Maize stalk infected naturally by bacterial soft rot, showing the rotting of the basal internodes. It is caused by *Pectobacterium carotovorum* f. *zeae*.

first, then dry up, and finally die. The roots may also be affected, turning into disintegrated slimy masses.

The pathogene has been identified as *Pectobacterium carotovorum* f. *zeae*, earlier recorded by Sabet (3). A pure culture of the bacterium has been deposited in the British Type Culture Collection for Bacterial Plant Pathogens.

This condition, which was prevalent a few years ago but was very uncommon in 1960, has again flared up in 1961, due to the high temperature and humidity prevailing during May and June. It indicates that this condition cannot be ignored in future work.

Other stalk and root rots

Charcoal stalk rot, caused by *Rhizoctonia bataticola*, is another disease which is sometimes observed toward the maturity of the crop. The pathogene produces root rot symptoms in the seedlings. In the adult plants, the surface of rotted internodes turns gray, and innumerable sclerotia, which are visible to the naked eye, are present outside and inside. The interior of affected stalks is completely disintegrated, leaving behind only the vascular bundles, which are fully covered with tiny black sclerotia (Figure 5). This organism does not produce any of the three conditions described above, but its role in this complex, if any, should be carefully examined.

Kernel or ear rot of maize, due to *Fusarium moniliforme*, is another disease which has sometimes been observed in the field. This pathogene is known to be ubiquitous in maize fields. In addition to kernel or ear rot symptoms (Figure 6), it can produce seedling blight and stalk rot, showing red discoloration in the interior of the affected stalks, under certain environmental conditions (2). In Egypt, however, it has been found to produce only kernel and ear rot symptoms under natural condi-

Figure 5. Maize stalk infected naturally by charcoal rot, caused by *Rhizoctonia bataticola*.

Figure 6. Maize ears infected naturally with kernel rot.

tions and blight symptoms in the artificially infected seedlings. As far as the writers have been able to ascertain, it does not play any role in the development of any of the three conditions under study, as has been claimed by some other workers, although the organism is very frequently isolated from the rotted stalks.

A solitary case of severe root rot of maize was observed at Sids in Beni-Suef. The characteristic symptoms consist of complete rotting of the roots, followed by drying up of the plant. The mycelium of a fungus, which is milk-white in color, fast-growing and cottony in texture, was easily detectable on the outside and inside of the affected stalk. This fungus has been consistently isolated from the diseased plants. It has been shown to produce root rot symptoms in seedlings in artificial inoculations.

Literature cited

1. Hingorani, M.K., U.J. Grant and N.J. Singh. 1959. *Erwinia carotovora* f. sp. *zeae*, a destructive pathogen of maize in India. *Indian Phytopathology* 12 : 151-157.
2. Koehler, B. 1960. Cornstalk rots in Illinois. *Illinois Agr. Exp. St. Bull.* 658.
3. Sabet, K.A. 1954. A new bacterial disease of maize in Egypt. *Emp. Jour. Exp. Agr.* 22 : 65-67.
4. Samra, A.S. 1953. A bacterial rot of maize in Egypt. Agr. Res. Comm., Min. Agr., Egypt.

Recommended Analytical Methods for Pesticides

6. EVALUATION OF WETTING AGENTS[1]

Collaborative Pesticides Analytical Committee, c/o Plant Pathology Laboratory, Harpenden, Herts, England

The laboratory evaluation of wetters for agricultural purposes has frequently been based, at least in part, on surface tension measurements. Thompson[2] has shown that surface tension is unreliable for evaluating wetters for wetting leaf surfaces at high volume. He has also shown that the Draves test, based on the wetting of cotton hanks, is a possible laboratory procedure for evaluating such wetters. Subsequent work, carried out by a joint committee of the Ministry of Agriculture, Fisheries and Food and the Associate of British Manufacturers of Agricultural Chemicals in the United Kingdom, has proved that a modified Shapiro test, based on the sinking time of a standard cotton tape, gives rather better results and requires considerably less experimental skill. This test may be satisfactorily used for evaluation of wetters in both soft and hard water, and for the evaluation of wetters intended as additives to aqueous dispersions of pesticidal formulations. A satisfactory wetting solution for application at high volume spraying rates to leaves which are difficult to wet will be obtained at such a concentration that will give a sinking time of not more than 15 seconds with the tape test.

In addition, a standard leaf-dipping procedure has been worked out for evaluating the performance of wetters on leaf surfaces such as cabbage. It has been shown that results obtained from the modified Shapiro test are related to the complete wetting of cabbage leaves by dipping or spraying.[3]

WE 1 Determination of wetting of tape by modified Shapiro's method

Principle. A weighted length of cotton tape is dropped into a tall cylinder containing an aqueous solution of a wetting agent. The time required for the thread connecting the weight and the tape to relax is recorded as the sinking time. Concentrations of wetters requiring a sinking time of 15 seconds are compared. The test may be used on formulated pesticides but does not necessarily apply to cationic wetters.

Reagents

Sodium di-(2-ethylhexyl) sulphosuccinate, 0.5 percent standard stock solution.
Dry a sample at 95° C. for two to three hours and store in a desiccator.
Accurately weigh 5.00 gm. of the dried compound and dissolve in 1 liter of distilled water (Note 1).

Apparatus

Hooks of standard weight and attached anchors (Figure 1, Note 2)
Cotton tape (Note 3)
500 ml. measuring cylinders
1,500 ml. beakers
1,000 ml. volumetric flasks
100 ml. bulb pipette (or aspirator)
Bulb transfer pipettes, assorted sizes
Thermostatic water bath, 25° ± 0.25 °C.
Stop watch

[1]These methods were accepted in November 1960 as provisional CPAC methods by the Collaborative Pesticides Analytical Committee (CPAC), which consists of scientists from ten European countries having a substantial chemical industry. The original methods are in English.

[2]Thompson, C.C. 1958. The efficiencies of wetting agents used in agricultural sprays. *Jour. Sci. Food Agr.* 9 : 650-657.

[3]Ashworth, R. de B. and G. A. Lloyd. 1961. Laboratory and field tests for evaluating the efficiency of wetting agents used in agriculture. *Jour. Sci. Food Agr.* 12 : 234.

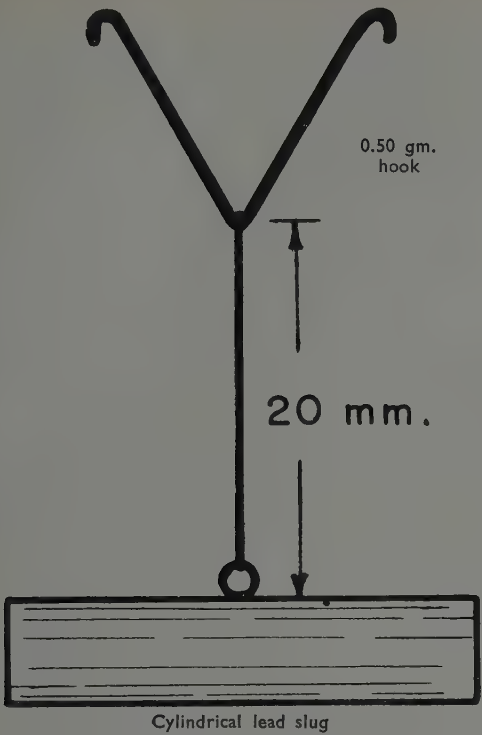


Figure 1. Diagram of hook and anchor used for determination of sinking time of cotton tape in the modified Shapiro's method. The wire hook weighing 0.50 gm. is connected with a nylon thread to a flat cylindrical lead slug of 30 to 40 gm. in weight.

Procedure [4]

(i) *Preparation of test solutions.* Stock solutions of the samples to be tested are normally prepared to contain 5 gm. of a surfactant per liter, unless the solubility is so poor that less must be employed. Dissolve the sample in about a quarter of the necessary water at the minimum temperature at which the material will dissolve, and then dilute to the final volume with cold distilled water. Dilute suitable aliquots to 1,000 ml. with distilled water and maintain at 25° ± 0.25°C.

(ii) *Determination of sinking time.* Pour the dilute solutions for test into 1.5 liter beakers to ensure mixing, and thence into the cylinders (Note 4). Place the cylinders in a water batch at 25° ± 0.25°C. Leave the cylinders after filling until all bubbles below the surface of the solution have risen to the top before sinking tests are made. Remove foam on the surface of the solution with a 100 ml. pipette or aspirator (Note 5).

Place a ruler over a length of tape laid without tension on a flat surface, and cut 22 cm. lengths as required. Insert the hook through the tape about 0.5 cm. from one end of a 22 cm. length. Hold the tape by the free end, with the anchor and the bottom of the hook immersed in the wetting solution contained in a 500 ml. cylinder. Start a stop watch as the tape is dropped into the solution. Stop the watch when the buoyant tape definitely starts to sink to the bottom of the cylinder (Note 6). At least five tests must be made for each concentration of wetting agent.

(iii) *Standardization of the tape.* Determine the sinking time of each batch of tape by the standard procedure with a 0.02 gm. percent solution of sodium di-(2-ethylhexyl) sulphusuccinate, prepared by dilution of the stock solution with distilled water. The mean of five determinations at 25°C. should normally give a sinking time of 15 ± 1 seconds.

(iv) *Interpretation of results.* Plot the values for the concentrations of wetting agents expressed as gm. — % w/v on the horizontal scale or X-axis of log-log graph paper. Similarly, plot mean sinking times in seconds on the vertical scale or Y-axis. Draw a smooth curve through the points and determine the concentration of wetting agent which corresponds to a sinking time of 15 seconds (Figure 2).

(v) *Precision of the method.* A deviation of approximately plus or minus 7 percent may be expected for results evaluated by the log-log procedure.

NOTE 1. The sample of sodium di-(2-ethylhexyl) sulphosuccinate for the preparation of standard solutions should be of such purity that only 2-ethyl hexanol is detected by gas chroma-

[4]Modified from the method described by L. Shapiro, *American Dyestuff Reporter* 39:38-45; 62. 1950.

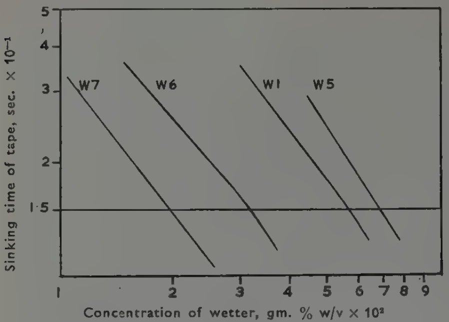


Figure 2. Evaluation of wetting agents, on log × log scale. See text for interpretation.

tography. Additional analytical confirmation and specifications of purity are described in the Merck Index, 6th ed. (1952) pp. 146-147. Sodium di-(2-ethylhexyl) sulphosuccinate may be obtained from Messrs. Hardman & Holden, Clayton Works, Manchester 11.

NOTE 2. Prepare the hook and attached anchor as follows: Bend a piece of No. 16 S.W.G. (1.625 mm. diameter) stainless steel wire about 3.5 cm. in length into the form of a two-pronged hook (Figure 1). File the ends to sharp points and adjust the weight to exactly 0.50 gm. Attach the hook with a length of nylon thread to a loop of wire secured to the center of a flat cylindrical lead slug of 30 to 40 gm. in weight. The distance between the base of the hook and the anchor should be 2 cm.

NOTE 3. One inch tape conforming to B.S. 1625, 1950: "Woven Cotton Tape Medium Quantity" with 73 warp ends and 36 weft picks per inch is suitable and may be obtained from Hydn H. Levey & Sons Ltd., Bristol House, 19-20, Holborn Viaduct, London, E.C.1. The tape is uniformly woven from untreated cotton yarn, free from defects, and has straight and firmly woven selvedges. The width of the tape should be 1 ± 0.04 in., the weight per 144 yd. should be 25 ± 1.25 oz., and the minimum breaking load 70 lb.

NOTE 4. If the more dilute solutions are tested first, the beakers and cylinders need not be rinsed and dried each time.

NOTE 5. The same diluted solution may be used many times without apparent exhaustion of the wetting agent. This may not be applicable to cationic wetters.

NOTE 6. In the case of cloudy solutions, it may be difficult to observe movement of the tape when tests are made with emulsions or suspensions. Where great accuracy is not required, attach a short length of nylon thread to the free end of a length of tape and counterbalance over the side of the cylinder with a 20 mg. weight. Upward movement of the weight indicates the sinking time.

For greater accuracy, use a square-sided vessel with side illumination from a powerful light source, or alternatively, wind a length of insulated single core copper wire closely round a 500 ml. cylinder to a height of 1 in. from the base of the cylinder. Similarly, construct a secondary coil of four to five times the number of turns on the primary. Connect the primary coil to a source of alternating current at 6 to 12 volts and the secondary coil to a sensitive milliammeter. When a hook of iron wire enters the field produced by the primary coil, a current is induced in the secondary coil. Thus, record the sinking time by observing the movement of the ammeter needle.

WE 2 Determination of wetting of leaf surfaces

Principle. A freshly picked leaf is immersed in a solution of a wetting agent under standardized conditions and a visual determination of the area wetted is made. The minimum concentration of wetting agent which will produce complete wetting of a cabbage leaf is indicated by the concentration of wetting agent which will give a sinking time of 15 seconds by the tape test (WE 1).

Apparatus

500 ml. beakers
Thermostatic water batch, 25° ± 0.25°C.

Procedure

(i) *Method.* Transfer 400 ml. portions of solutions of wetting agents at suitable concentrations to beakers partly immersed in a water batch at 25°C. (Note 1). Immerse a freshly picked undamaged leaf in the test solution (Note 2) for one second and after five seconds with the leaf held vertically make a visual estimate of the percentage area wetted (Notes 3 and 4).

(ii) *Evaluation of results.* To compare the wetting properties of a group of wetting agents for a leaf such as cabbage, which is difficult to wet, determine the minimum concentration of wetting agent which produces 100 percent wetting of 80 percent of the number of leaves

TABLE 1. RESULTS OF LEAF-SURFACE WETTING IN RELATION TO RESULTS WITH THE TAPE METHOD

Sample of wetting agent	Tape test Concn./15 sec. wetting time Wetter gm. - % w/v	Leaf-wetting test Concn./100% visual wetting of January King cabbage leaves Wetter gm. - % w/v[a]
A	0.057	0.025 — 0.050
B	0.540	> 0.50
C[b]	0.020	0.205 — 0.050
D	0.055	0.025 — 0.050
E	0.066	0.050 — > 0.10
F	0.032	0.020 — 0.050

[a]The results are recorded as ranges of wetter concentrations to produce 100 percent wetting on cabbage leaves from plants 6 to 20 weeks old respectively.

[b] Standard wetter: sodium di-(2-ethylhexyl) sulphosuccinate.

tested. A comparison of the wetting of the tape and cabbage leaves is given in Table 1.

With cabbage of the January King variety, the middle largest leaves from plants of the same age should be used for comparative wetting tests, since they are more difficult to wet than the lower- or higher-positioned leaves.

NOTE 1. Remove foam or air bubbles from the surface of a solution before tests of leaf wetting are made.

NOTE 2. It has been shown that dipping a leaf in the solution gives results comparable to high-volume spraying.

NOTE 3. Make at least five tests with leaves from different parts of the plant. Do not touch any surface of the leaf when withdrawing it from the beaker.

NOTE 4. Visual assessment of percentage area wetted may be subject to large errors between 5 and 95 percent levels, particularly with cabbage leaves, hence the need to relate the concentration to 100 percent wetting.

OUTBREAKS AND NEW RECORDS

PAKISTAN

Zia Ahmad Siddiqui and Abdul Ghaffar, Department of Plant Protection, Karachi

Onion, a new host of *Macrophomina phaseoli*

Macrophomina phaseoli (Maubl.) Ashby causes charcoal rot in at least 293 species of plants in different parts of the world.[1,2,3] On the genus *Allium*, the fungus was reported on garlic (*A. sativum*) but not on onions (*A. cepa*).

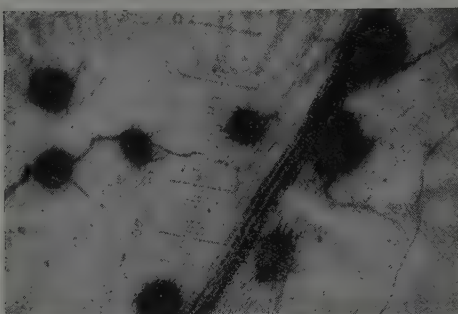


Figure 1. Sclerotia of *Macrophomina phaseoli* on an onion scale. × 60

In April 1961, an onion bulb of an unknown white variety, infected with *Macrophomina phaseoli*, was collected from a vegetable market in Karachi. This appears to be the first report of the fungus on this host. The fungus produced a dark blemish consisting of minute black sclerotia scattered throughout the scale leaves of the bulb, both on its inner and outer surfaces (Figure 1). Under the microscope the sclerotia appeared smooth, somewhat round to elongate, and measuring 62.8μ — 235.5μ × 47.1μ — 94.2μ (average 106μ × 77.8μ). The sclerotia were connected by a single hypha. The pycnidial stage of the fungus was not observed. The specimen was deposited in the National Mycological Herbarium of the Department of Plant Protection, Karachi, under Accession No. 4049.

Onion is an important garden vegetable crop in Pakistan. Whether the colored varieties of onions are resistant to this fungus, as in the case of onion neck rot or onion smudge, is under investigation.

[1]Kausar, A.G., A. Ghaffar and A. Kafi. 1957. Hosts of *Rhizoctonia bataticola* (Taub.) Butl. in Pakistan. (Abs.) IX *Pakistan Sci. Conf.* (Biology Section), pp. 21-22.

[2]Riley, E.A. 1960. A revised list of plant diseases in Tanganyika Territory. *Commw. Mycol. Inst. Mycological paper* No. 75.

[3]Young, P.A. 1949. Charcoal rot of plants in east Texas. *Texas Agr. Exp. Sta. Bull.* 712.

PERU

C. Bazán de Segura, Comité de Defensa Técnica del Algodón, Lima

Records of new diseases

Rhizomorpha blight of coffee. In October 1960 samples of coffee branches and leaves were received from the Tingo Maria area in the Huánaco Department, which were infected by a new fungus disease. As reported by Mr. E. Peñaherrera, this disease was observed on four trees in a plantation which was being recuperated. Two of the trees were heavily infected, while in the other two infection was at an initial stage. Apparently the infection begins on branches and stems at the lower part of the tree, where the shade and other microclimatic factors may favor the development of the fungus.

The mycelium of the fungus forms white thick rhizomorphs with club-like protuberances

(Figure 1) on the branches. It also covers the lower surface of the leaf in web-like appearance. Affected leaves wither and turn white-yellow in color, remaining attached to the stem by the mycelial strands.

The disease causes severe defoliation and kills branches and shoots. On an affected tree, most of the flowers wither before opening and only a few develop further. The fungus may spread onto the fruit but it apparently does no damage.

The causal fungus was determined as *Rhizomorpha corynephora* Kunze, in accordance with the description by Shear.[1] It was previously reported from Venezuela and Brazil on guava (*Psidium guava*). This is the first record of its occurrence in Peru and its infection of coffee.

Powdery mildew of pepper. Powdery mildew causes serious losses in the fields of capsicum pepper in the Department of Tacna. Samples of infected leaves were sent in for identification by Mr. J. Herrera of the Estación Experimental de Agricultores de Cañete. The causal fungus was subsequently determined as *Oidiopsis taurica* (Lév.) Salmon.

The fungus produces a white powdery covering on the lower surface of the leaf, while the corresponding areas on the upper surface turn yellow. Infected tissues become necrotic and diseased leaves wither and drop, resulting in severe defoliation.

Figure 1. Rhizomorpha corynephora Kunze on coffee, showing the formation of coremium-like protuberances.

[1]Shear, C.L. 1946. Mycological Notes VIII. *Mycologia* 38 : 664-673.

VENEZUELA

P. Guagliumi, Centro de Investigaciones Agronómicas, Ministerio de Agricultura y Cría, Maracay

Occurrence of chinch bug

Although chinch bug (*Blissus leucopterus* Say) has never been reported from Venezuela, it probably has a wide distribution in the country, infesting a large number of herbaceous plants, mainly grasses. During recent years root damage caused by chinch bug had been recorded at various places in cultivated and wild plants.

Rice was found to be infested in October 1957 in the neighborhood of Araure in the State of Portuguesa. At Yaritagua in the State of Yaracuy, damage was reported on sorghum and maize in April 1957 and on *Panicum purpurascens* and *P. maximum* in May 1958. A light infestation of ratoon sugar cane was observed in April 1958 near Barquisimeto in the State of Lara. Sugar cane was also reported infested in April 1961 at San Joaquín in the State of Carabobo, where the insects were more abundant on the lower portion of the cane than on the roots and they were also present in bore holes made by *Diatraea* larvae.

The occurrence of chinch bug has been reported mainly in the dry summer season. In the few cases where the pest was found on sugar cane or grasses in the winter, it did only little damage and was readily killed by frequent rains. Predators or parasites have not been observed.

In addition to Venezuela, chinch bug is known to occur in Colombia and Peru in South America.

YUGOSLAVIA

Osvaldo Lovisolo, Stazione di Patologia Vegetale, Rome, Italy, and
Milivoje Acimović, Institut za Ratarstvo di Novi Sad, Yugoslavia

Occurrence of *Hadrotrichum sorghi* on sorghum

During a disease survey carried out in sorghum fields in the Novi Sad area of the Republic of Vojvodina, sugar sorghum and *Sorghum halepense* were found to be attacked by *Hadrotrichum sorghi*. This fungus had not previously been reported from Yugoslavia.

Hadrotrichum sorghi was not found on the following hybrid sorghums examined: Amak R 10, Amak R 12, Beefbuilder, B 400, B 410, Coastal, C 44 A, E 56 A, F 62 A, F 63 A, Grazer, NK 145, NK 210, NK 230, NK 300, NK 320, Ranger, Reider, Rocket, Siloking, X 3000. Lovisolo[1] earlier found in Italy that the variety Martin's Combine Milo, which has been used as a parent plant for many hybrids, is relatively resistant to this fungus. These observations seem to indicate that the new hybrid sorghums, in contrast to sugar sorghum and Sudan grass, possess at least field immunity to *H. sorghi*.

---

[1]Lovisolo, O. 1959. Osservazioni sull'*Hadrotrichum sorghi*, agente di una nuova malattia dei sorghi coltivati. *Boll. Staz. Pat. Veg. Roma*, Ser. 3, 16: 155-182.

PLANT QUARANTINE ANNOUNCEMENTS

CHILE

Decree No. 1 of the Ministry of Agriculture dated 2 January 1961, published in the *Diario Oficial de la República de Chile* No. 24858 of 30 January 1961, replaces Articles 42 and 43 (prohibition and restriction of importation) of Decree No. 622 of 15 May 1950, issued by the Ministry of Agriculture, providing for regulations to the Plant Protection Law No. 9006 of 1948.

The present Decree repeals the Decrees of the Ministry of Agriculture No. 373 of 29 February 1952, No. 277 of 24 April 1953, No. 392 of 28 July 1954, No. 510 of 12 August 1954, No. 653 of 30 July 1955, No. 949 of 31 October 1955, No. 694 of 6 October 1959, No. 194 of 3 March 1960, No. 284 of 31 March 1960, No. 349 of 28 April 1960 and No. 820 of 3 November 1960.

Provisions in Decree No. 622 regulating importation through Magallanes remain unchanged.

Phytosanitary certificates are required for materials mentioned in the Decree, attesting freedom from pests and diseases in the place of origin, and indicating treatments before shipment, as required.

Importation prohibited

1. Seed of all kinds infested with any of the following insects: *Sitotroga cerealella, Spermophagus pectoralis, Laspeyresia glycinivorella, Pectinophora gossypiella, Disdercus* sp., species of Bruchidae.

2. Sunflower seed, unless authorized by the Department of Agricultural Research for experimental purposes. The imported seed must be grown under postentry quarantine.

3. Potatoes and tubers of the genus *Solanum* except :

(*a*) potatoes for consumption under permit of the Directorate of Agriculture and Fisheries, provided they originate from an area free from *Heterodera rostochiensis* and *Corynebacterium sepedonicum* ; and

(*b*) seed potatoes under permit, which must originate from areas free from *H. rostochiensis* and *C. sepedonicum* ; they must be resistant to wilt and other potato diseases and of the grade "fundación," "genética" or "garantizada."

4. Scions, branches, buds, seeds, bulbs, tubers or roots found to be infested or infected with harmful pests and diseases.

5. Plants, rootstocks, scions and parts of plants (except seed) of such species as apple, pear, quince, peach, nectarine, mazzard cherry, cherry, walnut, grape vine, pecan nut, raspberry, red currant, and other species of *Ribes* and *Rubus*.

Plants and parts thereof of fruit species considered indispensable for fruit industry may be imported through the Department of Plant Protection and must be grown under postentry quarantine. Cuttings of grapevine or American grapes resistant to *Phylloxera* must in addition originate from areas free from Pierce's disease (*Medicago* virus 3).

6. Plants, rootstocks, scions and any other parts of plants of the genus *Citrus*, except oranges, which may be imported if treated with prescribed ethylene dibromide or cold treatment.

7. Rootstocks, scions and any other parts of plants (except seed) of olive trees for multiplication.

8. Plants or parts thereof infested with *Quadraspidiotus perniciosus, Diaspis pentagona, Euproctis chrisorrhoea, Porthetria dispar, Laspeyresia molesta, Pyrausta nubilalis*, or *Nygmia phaerrhoea.*

9. Potted plants or plants with earth ball attached. Importation will be permitted after soil has been cleaned and plants found in satisfactory health condition.

10. Maize, cereals in general, and tubers such as sweet potatoes and potatoes, etc., from Easter Island, San Ambrosio, San Felix and Juan Fernandez are considered as being introduced from abroad and subject to restrictions.

11. All species, hybrids and seeds of cultivated varieties of *Castanea.*

12. Plants of all species of *Pinus* (except seed).

13. Seeds, plants and parts thereof of the genera *Berberis, Mahonia* and *Mahoberberis*, except those immune to *Puccinia graminis.*

14. Plants (except seed but including timber and bark) of the genera *Larix, Ulmus* and *Zelkova.*

15. Plants and seeds of the genus *Rhamnus*, except those immune to *Puccinia coronata.*

16. Plants (except seed) of the genus *Corylus.*

17. Broomcorn or other sorghum for broom making ; any goods packed in straw, grass or branches of any kind ; straw cones as packing of bottled wine, liquor and liquids ; " tropical cane " used in some ships to load cargo. Broom may be introduced from Tacna, Peru, for use only in Arica, where it must be fumigated. Straw cones and straw as packing material for glass and chinaware is permitted if sterilized in the country of origin with steam at 115°C., or with formalin at 500 cc. per 20 cubic meters for at least eight hours at 20°C. or higher, or with another treatment to destroy *Pyrausta nubilalis.*

18. Fresh vegetables and fruits (except plantains, pineapples, coconuts and dates originating from countries where *Dacus dorsalis* does not occur, and avocado pears from Ecuador and Peru). This prohibition does not apply to vegetables for consumption in the provinces of Tarapaca, Antofagasta, Magallanes and the Department of Chañaral.

19. Any goods that may harbor living plant pests or disease organisms which cannot be detected with the equipment and methods currently used.

Importation restricted

The materials listed below may be imported only if the specified requirements and the general requirements for the introduction of plants and parts of plants have been fulfilled.

1. Cuttings, buds and other propagating materials of avocado, chirimoya (*Anona cherimola*), fig, lucumo (*Lucuma obovata*), meddar, *Populus* spp. and *Salix* spp., if free from pests, will be grown under postentry quarantine.

2. Bulbs, tubers, rhizomes, fleshy roots, corms and similar parts of plants must be free from *Heterodera rostochiensis.* Special treatments for such propagating materials may be prescribed.

3. Avocado pears from Ecuador are subject to conditions mutually agreed to as given in Decree No. 726 of 22 April 1942.

4. Seeds of clover, alfalfa, fodder grasses and others may not contain seeds of noxious weeds. The following are considered noxious weeds in Chile : *Allium vineale, Cardaria draba, Carthamus lanatus, Cirsium arvense, Salsola kali, Allium* sp., *Cyperus esculentum, Galega officinalis, Hypericum perforatum, Kochia scoparia, Arrehnatherum elatius* var. *bulbosum, Sorghum halepense.* The number of *Cuscuta* seed may not exceed five per kilogram, and the total amount of common weed seeds not 0.5 percent by weight.

Seed consignments containing seeds of prohibited weeds or weeds not recorded in Chile must be cleaned under official supervision. Consignments accompanied by an official purity certificate will not be subject to this provision.

5. Seeds of beans, peas, tomatoes, red peppers, barley or lettuce must originate from areas or countries free from *Corynebacterium flacumfaciens, Xanthomonas phaseoli, Pseudomonas*

pisi, *C. michiganensis*, *X. vesicatoria*, barley stripe mosaic or lettuce mosaic.

6. Cotton seed for planting or oil production and unginned cotton must originate from areas or countries free from *Platyedra gossypiella*, *Disdercus* sp. and *Anthonomus* sp. Otherwise it must be fumigated or heat-treated before shipment. Cotton seed must be packed in durable bags and those for oil must be processed immediately after arrival.

7. Linseed for planting or processing must originate from countries or areas free from *Fusarium lini*. Linseed for planting will be grown under postentry quarantine.

8. Maize seed must originate from areas or countries free from *Xanthomonas stewarti*, and a certificate to this effect must be countersigned by the Chilean Consul. Only those varieties, hybrids, or inbred lines authorized by the Department of Agricultural Research may be imported in specified quantities.

9. Wheat and maize for consumption or sunflower seed for industrial use may be imported only under the authorization of the Directorate of Agriculture and Fisheries and under the conditions specified by the Department of Plant Protection.

10. Rice seed requires a permit from the Directorate of Agriculture and Fisheries, provided it originates from areas free from *Bacillus oryzae*, *Piricularia oryzae*, *Xanthomonas oryzae*, *Helminthosporium oryzae* and rust, and is so indicated on the phytosanitary certificate.

11. Strawberry plants may be imported only from areas and countries free from *Phytophthora fragariae*.

12. Plants, parts of plants, timber, poles, bark, etc., of conifers, *Ulex* and *Laurus* may be imported if originating from zones or regions free from *Porthetria dispar* and *Nygmia phaeorrhoea*.

13. Rose plants, cuttings or parts thereof must originate from areas or regions free from rose mosaic (*Rosa* virus 1), rose wilt (*Rosa* virus 3) and rose streak (*Rosa* virus 4).

14. Living insects beneficial to agriculture may be imported only through the Department of Plant Protection under a permit from the Directorate of Agriculture and Fisheries. Importation of bees (*Apis mellifica*), bee products such as bee glue and honeycombs, tools, and other used apicultural materials, is prohibited, except bees imported by the Department of Animal Husbandry.

15. Living arthropods (e.g., insects, arachnids, centipedes), invertebrates without appendages (e.g., nematodes), protozoa, fungi, bacteria and viruses, or any similar form of organisms which are injurious to plants, may not be imported without a permit from the Department of Plant Protection, except for scientific or educational purposes. Such imports may be made only through the customs at Santiago, and the number of the import permit must be indicated outside the package. They must be accompanied by a certificate issued by the authority of the country of origin.

ITALY

Ministerial Decree of 2 August 1961, published in the *Gazzetta Ufficiale della Repubblica Italiana* Vol. 102 No. 223 of 8 September 1961, regulates the importation of seed potatoes for the 1961/62 crop year.

The Decree authorizes the importation of seed potatoes for the 1961/62 crop season free of customs duty up to 600,000 quintals, from countries with which no agreement for free importation of seed potatoes exist. Importation must take place before 15 April 1962 through the following points of entry.

By rail. Ventimiglia, Modena, Domodossola, Luino, Chiasso, Fortezza, San Candido, Pontebba or Poggio Reale.

By sea. Genoa, Venice, Trieste, Leghorn, Civitavecchia, Naples, Bari, Brindisi, Taranto, Reggio Calabria, Messina, Palermo, Catania, Syracusa, Cagliari or Olbia.

Imports of seed potatoes must be approved by the Ministry of Foreign Trade and the Ministry of Agriculture and Forestry. Consignments of seed potatoes must be accompanied

by a phytosanitary certificate with the following additional declarations.

1. Declaration on origin and health, including :

(*a*) name and locality of the producing farm ;

(*b*) a statement that the consignment was found to be free from *Synchytrium endobioticum*, *Streptomyces* spp., *Phthorimaea operculella* and other disorders ;

(*c*) the producing farm was found to be free from *Corynebacterium sepedonicum*, *Heterodera rostochiensis*, *S. endobioticum*, *P. operculella*, *Epitrix* spp. (*E. cucumeris*, *E. fuscula*), and practically free from virus diseases ;

(*d*) the seed tubers must be free from soil and packed in new packings sealed by the Plant Protection Service.

2. Declarations regarding the consignment, giving the name of the variety, genetical classification, and marks on the packing indicating this, the number of the wagon, and the name and address of the holder of the import permit.

3. Declaration of field control, indicating that the fields were subject to rigorous selection and did not have signs of virus diseases.

Seed potatoes imported duty-free must originate from crops grown specifically for seed production, in compliance with the legislation of the country of origin and with Italian requirements. The potatoes must be of the highest grade, in accordance with the seed potato classification established in the producing country. Importation of potatoes of grades immediately inferior may be permitted only in special cases.

Phytosanitary conditions and genetical qualities of the seed potatoes must be guaranteed by the competent inspection service of the country of origin. The tubers must be sound, clean, well formed, and possess all the characteristics of the declared variety. It is prohibited to import seed potatoes from crops infected with virus diseases or from localities where *Heterodera rostochiensis*, *Corynebacterium sepedonicum*, *Synchytrium endobioticum*, *Epitrix cucumeris*, *E. fuscula*, *Phthorimaea operculella* or any other pest not permitted by the producing country occur.

NETHERLANDS

Order No. J. 1425 of 14 July 1961, published in the *Nederlandse Staatscourant* No. 135 on 14 July 1961, adds the following plant materials to the list of plants which may be imported only if accompanied by a phytosanitary certificate, and provided the consignments fulfill specified requirements (see *FAO Plant Prot. Bull.* 3 : 43-44, 1960). 40

1. Cut flowers and cuttings of carnation (*Dianthus caryophyllus*), which must be free from carnation tortrix moth (*Tortrix pronubana* Hb.).

2. Chrysanthemum (*Chrysanthemum indicum*) cuttings, which must be free from chrysanthemum gall midge (*Diarthronomyia chrysanthemi* Aalberg).

NICARAGUA

An Executive Order of 13 April 1961, published in *La Gaceta* Vol. 65 No. 102 on 10 May 1961, provides that all companies engaged in land, sea or air transport must not ship vegetative materials, plants and plant products into Nicaragua, unless each consignment is accompanied by a phytosanitary certificate issued by the country of origin.

TURKEY

An Order of the Ministry of Agriculture, published in the *Resmî Gazete* No. 10756 of 13 March 1961, prohibits the importation of seeds and plants of tomatoes, eggplants, chilis and other species of Solanaceae, in order to prevent the introduction of tobacco blue mold (*Peronospora tabacina*). This prohibition also applies to imports for scientific purposes.

UNITED KINGDOM

The Landing of Unbarked Coniferous Timber Order, 1961 (England and Wales, and Northern Ireland), prohibits the landing of un-

barked timber from trees of any coniferous species grown in, or brought from, Belgium, Denmark, Western Germany or the Netherlands. Unbarked timber is defined as logs or poles in the round, with some or all of the bark still present.

The above restriction does not apply to vessels stopping at a "prohibited" port of call but not unloading.

UNITED STATES

1. Foreign Plant Quarantine No. 37 concerning nursery stock, plants and seeds, was amended by a notice of 26 October 1960, published in the *Federal Register* Vol. 25, No. 212 on 29 October 1960. This amendment removes the postentry quarantine requirement for importation of *Rhododendron* (see *FAO Plant Prot. Bull.* 4: 175, 1956), including evergreen plants of all species and varieties and any deciduous species or varieties in foliage, when imported from Europe, Asia, New Zealand and North America north of the United States-Canadian border. The requirement was originally established to prevent the further introduction of the rust, *Chrysomyxa ledi* var. *rhododendri*, which had been introduced into the Pacific Northwest in the United States. However, it was later found that the rust does not produce spore stage III, which infects spruce, in that region. The damage to rhododendrons has been negligible.

2. Administrative instructions of 9 December 1960, prescribing conditions for entry of broomstraw without treatment, published in the *Federal Register* Vol. 25, No. 242 on 14 December 1960, supplements Quarantine 41 relating to Indian corn or maize, broomcorn, and related plants.

Broomstraw, when consisting of individual straws free from stems, stalks, stubs of stalks and leaves, may be imported without seasonal limitation through designated ports if the following requirements have been fulfilled.

(*a*) The broomstraw should be bundled with the base of the individual straws at the same end, without alternating the layers.

(*b*) Each bundle should be securely tied to prevent breakage.

(*c*) Bundles should be compacted, grouped into bales, and so arranged that the butt of each bundle is exposed on the outside of the bale.

(*d*) Each bale should be securely bound, to prevent shifting or loosening of the bundles in transit.

Broomstraw found to contain stems, stalks, stubs of stalks or leaves should be sterilized upon arrival. Contaminated broomstraw from countries other than those in North America, South America or the West Indies is subject to the regulations governing importation of broomcorn.

U.S. TRUST TERRITORIES OF THE PACIFIC ISLANDS

Plant and Animal Quarantine No. 9, issued on 17 July 1961, prohibits the importation of the following materials from Guam and the Philippine Islands.

1. Coconuts, coconut plants or any part thereof.

2. Pandanus fruits, pandanus plants or any part thereof.

3. Other species of palms, whether ornamental, food-bearing or indigenous, or any part of any palm plant.

4. Soil around the roots of plants, or soil in any other form, whether sterilized or not.

NEWS AND NOTES

BRAZIL ADHERES TO INTERNATIONAL PLANT PROTECTION CONVENTION

The Government of Brazil became party to the International Plant Protection Convention on 14 September 1961, when its instrument of adherence was received by the Director-General of FAO. The number of governments contracting to the Convention, including both signatory and adhering members, is thus at the time of writing 43, namely: Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Cambodia, Canada, Ceylon, Chile, Denmark, Dominican Republic, Ecuador, El Salvador, Federal Republic of Germany, Finland, France, Greece, Guatemala, Hungary, India, Iraq, Ireland, Israel, Italy, Japan, Korea, Laos, Luxembourg, the Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Philippines, Portugal, South Africa, Spain, Sweden, the Union of Soviet Socialist Republics, the United Arab Republic, the United Kingdom and Yugoslavia.

INTERNATIONAL SEED TESTING ASSOCIATION

The Committee on Plant Diseases of the International Seed Testing Association (ISTA) has made special efforts in recent years toward the development and standardization of laboratory methods for testing the health condition of seeds. The results of tests carried out during 1961 are summarized in a mimeographed report entitled *The comparative seed health testing 1961*, which may be obtained from: Dr. Paul Neergaard, Statens Plantetilsyn, Gersonsevej 13, Copenhagen-Hellerup, Denmark.

The following crops were included in the 1961 tests: meadow fescue grass (*Festuca pratensis*), English ryegrass (*Lolium perenne*), black medik (*Medicago lupulina*), peas and wheat. Twenty-four stations in 16 countries participated in the tests. In the report, the results are compiled in tabular form by crop and by testing method employed.

Stabilimento Tipografico Fausto Failli — Roma

AGRICULTURAL AND HORTICULTURAL SEEDS

FAO Agricultural Studies No. 55

The most recent in the series of FAO Agricultural Studies, this detailed, 530-page volume on the production, control and distribution of seeds of agricultural and horticultural crops is being prepared as a contribution to the 1961 World Seed Year. This publication represents the contribution of universal expert knowledge on the subject.

The study deals with the development, evaluation and choice of seed varieties, examines the fields of ecology and agronomy in some detail, and includes comment on such subjects as the evaluation and control of seed quality, seed distribution and trade, and promoting the use of good seed. Seed production of diverse crops is covered in the second part of the study.

There is an extensive bibliography and an index of botanical names, as well as a table of conversion factors.

Agricultural and horticultural seeds is available in English, French and Spanish editions through the Distribution and Sales Section of FAO in Rome, Italy, or through local sales agents.

$6.00 or 30s.

SALES AGENTS FOR FAO PUBLICATIONS

ARGENTINA	Editorial Sudamericana, S.A., Alsina 500, Buenos Aires.
AUSTRALIA	Melbourne University Press, 369 Lonsdale Street, Melbourne, C. I.
AUSTRIA	Wilhelm Frick Buchhandlung, Graben 27, Vienna I.
BELGIUM	Agence et Messagerizs de la Presse, 14-22 rue du Persil, Brussels.
BOLIVIA	Librería y Editorial "Juventud," Plaza Murillo 519, La Paz.
BURMA	(*Wholesale*) Orient Longmans Private Ltd., 17 Chittaranjan Avenue, Calcutta 13, India.
CANADA	Queen's Printer, Ottawa.
CEYLON	M.D. Gunasena and Co. Ltd., 217 Norris Road, Colombo II.
CHILE	Sala y Grijalbo Ltda., Bandera 140-F, Casilla 180D, Santiago.
COLOMBIA	"Agricultura Tropical," Avenida Jiménez Nº 7-25, Ofcs. 811/816, Bogotá; Librería Central, Calle 14, No. 6-88, Bogotá.
COSTA RICA	Imprenta y Librería Trejos, S.A., Apartado 1313, San José.
DENMARK	Ejnar Munksgaard, Norregade 6, Copenhagen K.
ECUADOR	"La Hacienda," Escobedo No. 1003 y P. Icaza, Casilla No. 3983, Guayaquil; Librería Muñoz Hnos. y Cía., Apartado 522, Quito.
EL SALVADOR	Manuel Navas y Cía., 1ª Avenida Sur 35, San Salvador.
ETHIOPIA	International Press Agency, P.O. Box No. 120, Addis Ababa.
FEDERATION OF MALAYA	Caxton Stationers Ltd., 13 Market Street, Kuala Lumpur.
FINLAND	Akateeminen Kirjakauppa, 2 Keskuskatu, Helsinki.
FRANCE	Les Editions A. Pedone, 13 rue Soufflot, Paris 5e.
GERMANY	Paul Parey, Lindenstrasse 44-47, Berlin SW 61.
GREECE	"Eleftheroudakis," Constitution Square Athens.
GUATEMALA	Sociedad Económico Financiera, Edificio Briz, Despacho 207, 6º Av. 14-33, Zona I, Guatemala.
HAITI	Max Bouchereau, Librarie "A la Caravelle," B.P. IIIB, Port-au-Prince.
HONG KONG	Swindon Book Co., 25 Nathan Road, Kowloon.
ICELAND	Halldor Jonsson, Mjostraeti 2, Reykjavik; Jonsson & Juliusson, Garðastraeti 2, Reykjavik.
INDIA	(*Wholesale*) Orient Longmans Private Ltd., 17 Chittaranjan Avenue, Calcutta 13; Nicol Road, Ballard Estate, Bombay I; 36-A Mount Road, Madras 2; Kanson House, 24/I Asaf Ali Road, Post Box 386, New Delhi; Gunfoundry Road, Hyderabad I; (*Retail*) Oxford Book and Stationery Co., Scindia House, New Delhi; 17 Park Street, Calcutta.
INDONESIA	Pembangunan Ltd., 84 Guning Sahari, Jakarta.
IRAN	Bagher Shariat, Atabak Road, Ferdowsi Str., Tehran.
IRAQ	Mackenzie's Bookshop, Baghdad.
IRELAND	The Controller, Stationery Office, Dublin.
ISRAEL	Blumstein's Bookstores Ltd., P.O. Box 4101, Tel Aviv.
ITALY	Libreria Internazionale U. Hoepli, Galleria Piazza Colonna, Rome; A.E.I.O.U., Via Meravigli 16, Milan.
JAPAN	Maruzen Company Ltd., 6 Tori-Nichome, Nihonbashi, Tokyo.
KOREA	The Eul-Yoo Publishing Co., Ltd., 5, 2-Ka, Chong-ro, Seoul.
LEBANON	Librairies Antoine, B.P. 656, Beyrouth.
MEXICO	Manuel Gómez Pezuela e Hijo, Donceles 12, Mexico, D.F.
MOROCCO	Centre de Diffusion Documentaire du B.E.P.I., 8 rue Michaux-Bellaire, Rabat.
NETHERLANDS	N.V. Martinus Nijhoff, Lange Voorhout 9, The Hague.
NEW ZEALAND	Whitcombe and Tombs Ltd., Auckland, Wellington, Hamilton, Christchurch, Dunedin, Invercargill, Timaru.
NIGERIA	University Bookshop Nigeria Ltd., University College, Ibadan.
NORWAY	Johan Grundt Tanum Forlag, Karl Johansgt. 43, Oslo.
PAKISTAN	East: Orient Longmans Private Ltd., 17 Nazimuddin Road, Dacca. West: Mirza Book Agency, 9-A Shah Alam Market, Lahore 7.
PANAMA	Agencia Internacional de Publicaciones, J. Menéndez, Plaza de Arango No. 3, Panama.
PARAGUAY	Agencia de Librerías de Salvador Nizza, Calle Pte. Franco No. 39-43, Asunción.
PERU	Librería Internacional del Peru, S.A., Casilla 1417, Lima.
PHILIPPINES	The Modern Book Company, 518-520 Rizal Avenue, Manila.
POLAND	Ars Polona, Krakowskie Przedmiescie, 7, Warsaw.
PORTUGAL	Livraria Bertrand, S.A.R.L., Rua Garrett 73-75, Lisbon.
SOUTH AFRICA	Van Schaik's Book Store, Pty., Ltd., P.O. Box 724, Pretoria.
SPAIN	José Bosch Librero, Ronda Universidad II, Barcelona; Librería Mundi-Prensa, Castelló 37, Madrid; Librería General Independencia, 8, Saragossa.
SWEDEN	C.E. Fritze, Fredsgatan 2, Stockholm 16; Gumperts A.B., Göteborg; Henrik Lindstahls Bokhandel, Odengatan 22, Stockholm.
SWITZERLAND	Librarie Payot, S.A., Lausanne and Geneva; Hans Raunhardt, Kirchgasse 17, Zurich I.
TAIWAN	The World Book Company Ltd., 99 Chungking South Road, Section I, Taipeh.
THAILAND	Requests for FAO publications should be addressed to: FAO Regional Office for Asia and thz Far East, Maliwan Mansion, Bangkok.
TURKEY	Librarie Hachette, 469 Istiklal Caddesi, Beyoglu, Istanbul.
UNITED ARAB REPUBLIC	Librarie de la Renaissance d'Egypte, 9 Sh. Adly Pasha, Cairo.
UNITED KINGDOM AND CROWN COLONIES	H.M. Stationery Office P.O. Box 569, London S.E.I. *Branches at:* 13a Castle Street, Edinburg 2; 2 Edmund Street, Birmingham 3; Tower Lane, Bristol I; 29 King Street, Manchester 2; 109 St. Mary Street, Cardiff; 80 Chichester Street, Belfast.
UNITED STATES OF AMERICA	Columbia University Press, International Documents Service, 2960 Broadway, New York 27, New York.
URUGUAY	Hector d'Elia, Oficina de Representación de Editoriales, Plaza Cagancha No. 1342, Montevideo.
VENEZUELA	Suma, S.A., Calle Real de Sabana Grande, Caracas; Libreria Politécnica, Apartado del Este, 4845, Caracas.
YUGOSLAVIA	Drzavno Preduzece, Jugoslovenka Knjiga, Terazije 27/11, Belgrade; Cankarjeva Zalozba, P.O. Box 41, Ljubljana.
OTHER COUNTRIES	Requests from countries where sales agents have not yet been appointed may be sent to: Distribution and Sales Section, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

FAO publications are priced in U.S. dollars and pounds sterling. Payment to FAO sales agents may be made in local currencies.

Printed in Italy